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## THE LIFE HISTORY OF CALEPHELIS BOREALIS (LEPIDOPTERA).

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Until quite recently, nothing seems to have been accomplished toward solving the life histories of any North American species grouped in the genus *Calephelis* Grote & Robinson, but in 1928 (Bull. So. Calif. Ac. Sc. XXVII: 80) and 1932 (Bull. So. Calif. Ac. Sc. XXXI:12) those indefatigable students of the preparatory stages of Californian lepidoptera, Dr. John A. Comstock and Commander Charles M. Dammers, published the life histories of *C. australis* Edwards and *C. nemesis* Edwards, illustrated in their usual beautiful manner.

On July 17th, 1932, while collecting lepidoptera with Mr. Frank E. Watson near Newton, New Jersey, he took our first specimen of *C. borealis* Grote & Robinson in a field near the edge of an open woods. Further search resulted in the capture of eleven more specimens, all in the woods, in this respect confirming the habitat mentioned by Dr. A. F. Brower (1929 Ent. News XL:125).

Careful observation on this and subsequent occasions (July 20th and 23rd) failed to reveal any ovipositing, although many more specimens were taken and the habitat of the species was definitely fixed in the open wood along limestone outcroppings and ridges. No water was present as mentioned by Dr. Brower nor were any specimens on any occasions observed settling on the under side of leaves as reported by that author (l.c.) and Dr. Holland (Butt. Bk. revised ed., 1931, 218). The locality was visited again on July 29th and August 4th without any specimen of *borealis* being seen and the season was apparently over.

In 1933, the locality was visited on May 17th for the purpose of checking the May record in the New York List (1926 Cornell University Agricultural Experiment Station Memoir 101:681) but without result.

The following year (1934) observations were made on April 24th, May 19th and June 20th but no specimen of *borealis* was seen. It is believed, therefore, that the May record is erroneous and that the species is single brooded in New Jersey. That year, the first specimens were taken on July 3rd. On that occasion, the food plant was indicated when ovipositing on *Senecio obovatus* Muhl. was observed. Some gravid females were confined over these plants and in a few days a number of eggs were obtained. One pair, taken in copulation accounted for about twenty eggs.

Three batches of larvae were reared: first, from the egg which was oviposited on July 3rd, second, from a batch of eggs oviposited in confinement on July 4th and 5th, 1934 and third, from a batch similarly oviposited on July 7th and 8th of the same year. The larvae hatched from the third batch, passed their first, second and third moults in less time than those hatched from the earlier eggs and by the time the former reached the fourth instar, the latter had caught up with them. The periods between moults in the fifth, sixth and seventh instars were

extremely irregular being 13-21 days, 9-33 days and 8-31 days respectively, indicating that the larvae in nature probably hibernated in the fifth and pupated in the eighth instars but were prevented from doing so while under observation because of unnatural conditions, such as warmth and plenty of fresh food.

Three larvae pupated the first year, one in the seventh, another in the eighth and the third in the ninth instar but the others hibernated in the seventh and eighth instars. Hibernation is believed to be the course in nature as six larvae were found on plants at Newton as late as September 26th, 1934. While it was impossible to determine with certainty in which instar they were, they were quite small, rather dormant and apparently preparing to hibernate. However, only three of these could be found the following Spring and they were dead. On the other hand, several reared larvae hibernated and one moulted twice the following Spring, pupated and gave forth an imago.

*Egg.* Flattened turban shape, about .5 mm. x .35 mm. Old rose color changing after about three days to claret and finally amber a couple of days before hatching. Top with depressed microphyle with eleven to thirteen rounded raised sides, surrounded by five rows of hexagonal reticulations, the first on the same plane as the top consisting of eleven to thirteen reticulations all dividing lines being raised, the second at nearly right angles to the first row consisting of ten to twelve reticulations, below a third row of twenty to twenty-two similar structures, below a fourth row of nineteen to twenty-one structures open on lower side, the base being slightly rounded.

Number observed 35. Duration of stage, ten to eighteen days.

The shell is not eaten with the exception of the microphyle. Eggs which took an unusual length of time to hatch, produced weak larvae which died in an early instar. Some larvae, which in early instars did not eat their moult skins, also died. The eating of the larval skins, however, only occurred in the earliest instars.

*First instar.* 1.5 mm., long, cylindrical shape, head small pale amber sparsely covered with short hairs; ocelli black, five arranged in a crescent and one at radius, the arc pointing backward; mouth parts red; forelegs and prolegs pale amber; body white, gradually turning light green as feeding proceeds; on the first abdominal segment are ten hairs in two rows pointing forward, four are longer than the body and all are arranged in the form of a collar; one row of long white hairs, pale pink at the base, on either side of dorsal line arising from slightly elevated rounded tubercles, these hairs, four in number on each segment, arise from the second thoracic to eighth abdominal segments point slightly forward and outward at the base then curve upward toward each other, meet, partly cross and curve backward. Another row of long hairs of unequal length on each side of body arise from rounded tubercles from the second thoracic to the ninth abdominal segments, these hairs, four in number on each segment, stand out on the same plane as the body, the shortest pointing downward, others crossing each other and pointing slightly forward, outward and backward; below this row of hairs and just above the forelegs is another row of tubercles with hairs on the first to third thoracic segments which decrease in size on each segment, the one on the

third being about half the size of the one on the first; there are two faint pink spots on either side of the third thoracic segment below the dorsal rows of hairs; four long hairs pointing backward arise from the tenth abdominal segment, two on either side.

Specimens observed 34. Duration, six to ten days.

At the first and each succeeding moult, the skin breaks behind the head between it and the first thoracic segment and along both sides below the lateral row of hairs as far as the first or second abdominal segments.

*Second instar.* 2.5 mm., similar to first except the hairs are longer and more numerous, especially on the forward part of the body. The collar of hairs pointing forward from the first thoracic segment conceals the head. Those on each segment arising from either side of the dorsal line consist of about eight hairs and about twenty arise from each segment in the lateral row. On the second thoracic to the fourth abdominal segments there are single spots of darker color below the dorsal row of hairs. A few hairs arise from above the prolegs and anal legs. Specimens observed 30. Duration, five to seven days.

*Third instar.* 3.5 mm., similar to second but the body is covered with innumerable small silvery stars which were barely indicated in the earlier instars. There is an additional row of spots below the three last mentioned, on the first to seventh abdominal segments. Specimens observed 28. Duration, six to nine days.

*Fourth instar.* 4.5 mm., similar to third but the first row of spots begin on the third thoracic segment; on the first to third abdominal segment it consists of two spots. Some of the larger hairs are dark. Specimens observed 32. Duration, eight to ten days.

*Fifth instar.* 5. mm., similar to fourth except hairs are more plentiful and finer although coarser ones are interspersed especially in the dorsal rows; the prolegs have two bands of short hairs circling them, one above the other, the upper band being longer. These legs are armed with brown hooks as are also the anal legs. Above and to the rear of anal legs are two low rounded tubercles with tufts of hair pointing backward. The ninth abdominal segment is flat on top with four spots in the shape of a square, bounded at rear and either side by broken lines and hairs. Specimens observed 30. Duration, thirteen to twenty-one days.

*Sixth instar.* 6.5 mm., similar to fifth, the third to sixth abdominal segments have a line parallel with body below dorsal row of hairs; there are indented designs consisting of dots and dashes on all thoracic segments between the rows of hair. The hooks on the prolegs consist of inner and outer rows, circular in shape but not meeting at the rear. The hooks on the anal legs are similar. Specimens observed 22. Duration, nine to thirty-three days.

*Seventh instar.* 8. mm., similar to sixth but the hairs thicker and finer. Specimens observed 7. Duration, eight to thirty-one days.

*Eighth instar.* 12 mm., similar to seventh, the collar of hairs on the first thoracic segment being particularly dense. Specimens observed 5. Duration, fourteen days.

*Ninth instar.* 15 mm., Only one larvae reached this instar, which continued for thirteen days when it pupated. At that time, it measured nearly 17 mm.; no difference was observed between this and the preceeding instar and the event was possibly abnormal.

*Pupa.* 10 x 3 mm. Abdomen yellow, wing cases light brown, thorax brown covered with short projecting hairs, and enclosed by long white hairs resembling a cocoon; a row of black spots down the center of the abdomen and four on either side—one to each segment—another on either side just above the wing cases. Three black spots on either side of thorax. One larva pupated on a leaf, the others on the sides of the glass vials. They were suspended at the anal ends, tied to the surface by a band of silk. Specimens observed 4. Duration, nineteen days.

#### EXPLANATION OF PLATE

Fig. 1.—Fifth instar larva, dorsal aspect.

Fig. 2.—Egg.

Fig. 3.—Fifth instar larva, lateral aspect.

Fig. 4.—Pupa before removing hairs.

Fig. 5-6.—Pupa, lateral and dorsal aspects after removing hairs.

### A REVIEW OF THE NEARCTIC SPECIES OF CHLOROPISCA (DIPTERA, CHLOROPIDAE) <sup>1. 2.</sup>

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Some recently discovered changes in nomenclature led to the preparation of a synopsis of the Nearctic species of *Chloropisca*, which is presented with notes upon the distribution as checked by the writer and a key to the eleven known species. *Chloropisca sulfurifrons* Duda is included with some doubt.

It is rather remarkable that among a group as common as *Chloropisca* so little is known regarding the life history and habits. *Chloropisca glabra* is the only species in which the life history is well known. Its larvae are predaceous upon root aphids, and are especially important predators of the sugar beet root aphid, *Pemphigus betae* Doane.

#### KEY TO THE NEARCTIC SPECIES OF CHLOROPISCA

1. Body black; mesonotum thickly punctate, gray pollinose posteriorly and laterally; vertical triangle with a short, broad and deep median sulcus ..... *atra* Curran.  
Body with some yellow markings, especially on the pleura and abdomen; mesonotum smooth, not pollinose; triangle not deeply sulcate ..... 2.
2. Triangle with orange ground color, marked with black ..... 3.  
Triangle entirely polished black (or black-brown, *obtusa*) ..... 5.  
Triangle smooth, polished yellow, only the ocellar spot black; cheeks linear; mesonotum with black stripes ..... *sulfurifrons* Duda.
3. Mesonotum yellow to orange with reddish stripes; triangle chiefly orange; large, broad species (3 mm.) ..... *rubida* Coq.

(1) Journal Article No. 259 (N.S.) from the Michigan Agricultural Experiment Station.

(2) The author is pleased to acknowledge the aid of Grant No. 352 from the Bache Fund of the National Academy of Sciences, which made possible the personal examination of the type specimens.

- Mesonotum black striped, the intervittate areas sometimes darkened; if reddish striped, the species is small and slender; triangle usually heavily marked with black ..... 4.
4. Triangle dark orange with black median stripe and two lateral stripes extending from the basal corners halfway to the apex; abdominal segments with yellow hind marginal bands; large, broad species (3 mm.) ..... *variceps* Lw.
- Triangle chiefly orange, with black lateral margins, in paler specimens entirely orange; abdomen black-brown with dull yellow apex; small, slender species (2-2½ mm.) ..... *pulla* Adams.
5. Mesonotum yellow with shining black stripes ..... 6.
- Disk of the mesonotum entirely black, without striping, although in paler specimens a basic pattern of stripes may be seen ..... 8.
6. Legs, except the tarsi, entirely yellow ..... 7.
- Legs predominantly black ..... *appropinqua* Adams.
7. Triangle large, broad at the base, the sides straight ..... *glabra* Meig.
- Triangle narrow, the sides strongly concave on the basal half ..... *glabra* var. *clypeata* Mall.
8. Legs predominantly black ..... *pullipes* Coq.
- Legs, except for a few tarsal segments, entirely pale yellow ..... 9.
9. Triangle large with very convex sides and obtuse apex, occupying almost the entire front; large species (3.5 mm.) ..... *obtusa* Mall.
- Triangle narrow, small, the apex somewhat acute ..... 10.
10. Triangle long and narrow, the sides straight; cheeks sub-equal in width to the third antennal segment; 2.5-2.75 mm. .... *grata* Loew.
- Triangle with convex sides; cheeks linear, 1-1.5 mm. .... *parviceps* Mall.

### ***Chloropisca appropinqua* Adams.**

1903. *Chlorops appropinqua* Adams, Kans. Univ. Sci. Bul., II, p. 39. [Kansas, Wyoming, Colorado].

1912. *Chloropisca appropinqua*; Becker, Ann. Mus. Nat. Hung., X, p. 32 (*Chloropidae* IV). (Gen. comb.).

1898. *Chlorops pullipes* Coquillett, Jour. N. Y. Ent. Soc., VI, p. 47, in part. *New synonym.*

The type series of both species have been examined by the writer. Becker's supposition as to the common identity of *appropinqua* and the striped form of *pullipes* is correct. Coquillett's name is hereby reserved for the form with entirely black dorsum, without striping. Other good characters were also found, so that the two may be distinguished as follows:

- Mesonotum vittate; cheeks very broad, much wider than the third antennal segment and over one-half the height of an eye; dorsum of the abdomen black, the sides, apex, and a faint narrow hind margin of the fourth segment yellow ..... *appropinqua* Adams.
- Disk of the mesonotum black, not vittate; cheeks narrower than, or subequal to, the width of the third antennal segment, and only equal to one-fifth or one-fourth of the height of an eye; abdomen with the black color extending down over the sides as far as the membranous venter, except on the first two segments, and with the apex and narrow hind margin of the fourth segment yellow ..... *pullipes* Coq.



Coquillett described *pullipes* from a long series of specimens from New Mexico and Colorado, and noted that the dorsum of the mesonotum was entirely black, but "sometimes marked with two yellow vittae." Becker (1912, op. cit., p. 32) noted that the striped form probably was equivalent to *appropinqua* Adams, but he included both forms in his key under the name *pullipes*.

Of the type series of *pullipes* [U. S. Natl. Mus. Colln.] the type and paratypes labelled only "Colo.," collected by C. F. Baker and H. K. Morrison, and two paratypes from Santa Fe, N. Mex., July and August (T. D. A. Cockerell) are true *pullipes* as here restricted. The paratype from Canon City, Colo. (H. F. Wickham) is really *appropinqua* Adams. Likewise, one specimen from Otero, N. Mex. (Cockerell), standing with the paratypes of *pullipes* in the National Museum, but not mentioned in Coquillett's original description, must be referred to Adams' species.

Distribution of *appropinqua*, western. ARIZONA: two, Bill Williams Fork, August, (F. H. Snow), [Snow Colln.]. COLORADO: two cotypes; also one, Fort Collins, June 11, 1920 [Colo. Agr. Coll. Colln.]. IDAHO: Shoshone Basin, June 11, 1926 (Haegele); Parma, June 13, 1928, (W. E. Shull); Jerome, July 6, 1926, (Haegele); Idaho Falls, July 20, 1926, (Haegele) [Idaho Univ. Colln.]. KANSAS: specimens have been seen from ten scattered counties, with Manhattan in Riley County as the extreme eastern limit of the known range (see Sabrosky, 1935, Trans. Amer. Ent. Soc., LXI, p. 218, for detailed records). NEBRASKA: Lodgepole and Kimball, [Oregon Agr. Coll.]; Lincoln, [author's Colln.]. NEW MEXICO: Torrance County, July, 1925, (C. H. Martin), [Snow Colln., Kansas Univ.]; Las Vegas [Oregon Agr. Coll.]. OREGON: Elgin, June 29, 1922, (A. L. Lovett; sweeping wheatfield); Pendleton, July 19, 1929, (H. A. Scullen; taken on *Grindelia* sp.); La Grande, Ore., July 20, 1929, (Scullen; taken on *Convolvulus* sp.), [J. Wilcox Colln.]; Hood River, [Oregon Agr. Coll.]. SOUTH DAKOTA: Platte, June 16, 1933, (H. C. Severin), [S. Dak. State Coll. Colln.]. UTAH: one, Pintura, August 11, 1929 (P. W. Oman), [Snow Colln.]. WYOMING: two cotypes, Lusk, (W. A. Snow and Hugo Kahl), [Snow Colln.]; Rock Springs [Oregon Agr. Coll.].

Becker's record from Colorado [Colln. Aldrich] was found to be correct, and his record from Lance Creek, Wyo. [Colln. Bezzi] is probably good also. Recently, Knowlton and Cutter (1932, Utah Acad. Sci. Proc., IX, p. 111) recorded it from Snowville, Utah.

The farthest north-eastern record known to the author is Lincoln, Nebraska, based on one specimen taken at a light trap, Sept. 26, 1933 (Don B. Whelan).

### ***Chloropisca atra* Curran.**

1926. *Chloropisca atra* Curran. Amer. Mus. Novitates, 220, p. 3 [Arecibo, Porto Rico].

The writer is doubtful whether the species has been placed in the proper genus. In the appearance of the head and triangle, and the fact that the scutellum is somewhat convex and the apical bristles are not closely approximated, the species appears to be closer to some of the Neotropical genera such as *Chloropisina* Becker, rather than to *Chloropisca*. It is referred for the present to the latter genus, as originally described, since the presence of a sensory area on the

hind tibiae will lead to that conclusion in Curran's manual.

The occurrence of *atra* in Texas would seem unusual, since it was described from Porto Rico. The author examined the holotype, and compared all of the following specimens with it.

Distribution: two, Cameron County, Texas, Aug. 3, 1928 (L. D. Beamer); one, Hidalgo County, Texas, Aug. 14, 1928 (Jack Beamer), [Snow Colln., Univ. of Kansas.].

### ***Chloropisca glabra* Meig.**

1830. *Chlorops glabra* Meigen, Syst. Besch., VI, p. 149, [Europe].

1866. *Chloropisca glabra*; Loew, Ztschr. f. Ent., Breslau, XX, p. 85. (Gen. Comb.).

Synonyms: *assimilis* Macq., *bistriata* Walk., *halteralis* Adams, *obesa* Fitch, *trivialis* Loew.

This cosmopolitan species is one of the commonest Choropids in general collecting. It probably occurs in every state in the Union and most of the provinces of Canada, for the writer has determined thousands of specimens from 35 states and the District of Columbia, ranging from Washington, Oregon, and California to Massachusetts, Florida, Louisiana, and Texas, and specimens from British Columbia, Saskatchewan, Ontario, Quebec, and Nova Scotia, as well as from Mexico. Published records are known to the writer from six other states. The life history and habits of *glabra* are quite well known, as noted in the introduction.

The synonymy of *Chlorops halteralis* Adams was verified by Sabrosky (1935, Ent. News, XLVI, p. 82) from the type in the Snow Collection, University of Kansas. Recently the writer also verified the synonymy of *Chloropisca trivialis* Lw. from the types in the Museum of Comparative Zoology.

### ***Chloropisca glabra* var. *clypeata* Mall.**

1914. *Chloropisca glabra* var. *clypeata* Malloch, Canad. Ent., XLVI, p. 119. [Illinois].

1915. *Chloropisca clypeata* Malloch, Ent. Soc. Wash. Proc., XVII, p. 158. [Illinois, Maryland, D. C.].

The status of this form is open to some doubt, and I have left it as a variety of *glabra*. Intermediates occur in the type series itself, examined by the writer in the collection of the Illinois Natural History Survey. Transitional forms are often found, particularly in the color of the clypeus, the spots on the pleura, and in combinations of the various characters. For example, in the case of a male and female from Washington, D. C., [N. Banks Colln.], glued on the same point and possibly taken *in coitu*, the male has a triangle as described for *clypeata*, whereas the female has a triangle typical of *glabra*. Both are very small, even for *glabra*. Furthermore, two others from Washington, D. C., August 20 [Banks Colln.] show the typical triangle of *clypeata*, but both have a very black clypeus, and except for the triangle are the usual *glabra*. One of these is small, the other is very large, as described for *clypeata*.

Perhaps the most distinctive feature lies in the peculiar shape of the triangle with its concave sides. The width of the front at the vertex is also appreciably less than at the anterior margin of the front. In view of the intermediate forms and the different combination of characters, however, *clypeata* should probably be regarded only as a variety of *glabra*.

Distribution, northern, chiefly north-eastern, on the basis of specimens which can be placed as typical *clypeata*. DISTRICT OF COLUMBIA: Washington, August 20, [N. Banks Colln.]. ILLINOIS: Algonquin and Urbana (type series),

also Centerville, Dubois, Elizabeth, Meredosia, Monticello, and Urbana, May 23—August 30, [Illinois Nat. Hist. Survey Colln.]. IOWA: Dickinson, Emmet, Hancock, Kossuth, Washington, Winnebago, and Wright Counties, May 21—August 13, 1934, [Iowa Wesleyan Coll. Colln.]. MASSACHUSETTS: one, Melrose Highlands, August 13, 1911, (H. E. Smith); two, Middlesex Falls, (N. Banks), [Mus. Compar. Zool.]. NEW YORK: one, Babylon, Long Island, August 3, 1933, (F. S. Blanton), [Blanton Colln.]. SOUTH DAKOTA: five, Brookings, Custer, Springfield, and White, June 28—July 26, (F. M. Hull, H. C. Severin), [S. Dak. State Coll. Colln.]. VIRGINIA: four, Falls Church, June 28, August 2, September 6 and 7, (N. Banks; two labeled "honey dew, tulip tree") [Mus. Compar. Zool.].

#### ***Chloropisca grata* Lw.**

1863. *Chlorops grata* Loew, Berl. Ent. Zeit., VII, p. 50. (Cent. III, no. 92). [Pennsylvania].  
1872. *Chloropisca grata* Loew, Berl. Ent. Zeit., XVI, p. 124. (Cent., Index). (Gen. Comb.).

Distribution, eastern and northern. The writer has determined specimens from localities in Colorado, Connecticut, Illinois, Michigan, Montana, New Hampshire, New York, and Pennsylvania and Washington, and from Quebec and British Columbia. Scattered records in the literature are known from Florida, Iowa, Maine, Massachusetts, New Jersey, Rhode Island, Vermont, and from Ontario and Manitoba. It was also recorded from Kansas in the literature, but Sabrosky (1935, Trans. Amer. Ent., Soc., LXI, p. 217) showed that these specimens were incorrectly determined, and possibly some of the other records may require checking.

#### ***Chloropisca obtusa* Mall.**

1914. *Chloropisca obtusa* Malloch, Canad. Ent., XLVI, p. 118. [Illinois].

Other than the type itself, collected at Champaign, Illinois, May\*30, 1889, (Marten), the writer has seen only three specimens, from Blue Hills Res., Mass. (labeled *C. grata* by C. W. Johnson). The only other record known to him is that by Gibson (1916, Ent. Soc. Ontario, Ann. Rept. for 1915, XLVI, p. 219) from Ottawa, Ontario, July 17, 1904 (W. Metcalfe).

#### ***Chloropisca parviceps* Mall.**

1915. *Chloropisca parviceps* Malloch, Ent. Soc. Wash. Proc., XVII, p. 158. [Illinois].

Malloch's species is quite close to *grata* Loew, but appears to be distinct on the basis of smaller size, linear cheeks, and the form of the triangle. In addition to the type series from Monticello, Mohamet, and Centerville, Illinois, the writer can record eleven specimens from Dubois, Galena Junction, Oregon, and White Heath, all in Illinois, May 22-July 8, and one from Mineral Springs, Indiana, July 2, 1916, [Illinois Nat. Hist. Survey Colln.]. No other published records are known to the writer.

The specimen from Indiana differs in having a shorter triangle than usual, but the variation is probably not significant.

#### ***Chloropisca pulla* Adams.**

1904. *Chlorops (Chloropisca) pulla* Adams, Ent. News, XV, p. 303. [Colorado].

1912. *Chloropisca monticola* Becker, Ann. Mus. Nat. Hung., X, P. 30. [Colorado]. *New synonym.*

1912. *Chloropisca pulla*; Becker, *op. cit.*, p. 33.

1912. *Chloropisca punctum* Becker, *op. cit.*, p. 35. [Texas]. *New synonym (or variety?).*

1912. *Chlorops integra* Becker, *op. cit.*, p. 66. [Massachusetts] *New synonym (or var. = punctum).*

1915. *Chloropisca integra*; Malloch, Ent. Soc. Wash. Proc., XVII, p. 162. (Gen. comb.).

The types of all three of Becker's species were studied by the author. The



type of *pulla* Adams has been lost and could not be examined. The late Dr. Aldrich has previously studied this type, however, and he indicated in his notes that *monticola* Becker was a synonym of *pulla*. The descriptions are almost identical, and Becker's species is therefore placed under *pulla*, on the authority of Aldrich.

In the same monograph, Becker also described *Chloropisca punctum* from Austin, Texas, and *Chlorops integra* from Woods Hole, Mass. Inasmuch as the types of both species are in Melander's Collection, it was possible to compare them directly, and there is no doubt of their similarity. They differ from typical *pulla* only in having paler, reddish-yellow legs, but there is so much variation in the character that it is doubtful whether this form should even be regarded as a variety. In other particulars, all specimens from widely separated localities have proved to be identical. All three species are therefore referred to *pulla* Adams, with *monticola* as an absolute synonym, and *punctum* as a synonym or pale-legged variety.

Distribution, widely distributed, but apparently not common. Type material: Marshall Pass, Colo., July 28, 1908, (Aldrich); Austin, Texas; Woods Hole, Mass. COLORADO: one, Poudre River Canyon, Aug. 22, 1931, (M. W. Sanderson), [Snow Colln., Kansas Univ.]. FLORIDA: one, Palatka, May 3, 1916, (J. C. Bradley), [Cornell Univ. Colln.]. GEORGIA: six, Prattsburg, July 25, 1930, (Beamer, Oman, L. D. Tuthill), [Snow Colln., Kansas Univ.]. IDAHO: one, Blackfoot, Sept. 5, 1932, (Louise Ireland); two, Caldwell, July 9, 1926, (C. Wakefield), [Idaho Univ. Colln.]; one, Burley, July 6, 1931, (R. H. Beamer), [Snow Colln., Kansas Univ.]. ILLINOIS: one, Dubois, April 24, 1914 (creek valley), [Illinois Nat. Hist. Survey Colln.]. INDIANA: two, "Indiana, June," (standing with the type series of *punctum* in Melander's collection, and apparently meta-types; they are not mentioned by Becker in the original description, though labeled types in the collection). LOUISIANA: two, Opelousas, April, 1897, [Arkansas Univ. Colln.]; three, Winnfield, June 27, 1918, (G. R. Pilate), [Mich. Univ. Mus.]. MASSACHUSETTS: one, Woods Hole, "7-21-2," (in the series labeled paratypes of *punctum*, but not mentioned in Becker's description). NEW YORK: one, Babylon, Long Island, July 25, 1933, (F. S. Blanton); four, Babylon, May 24 and May 30, 1934; two, Babylon, May 30, 1935, (Blanton and Borders), [Blanton Colln.]. SOUTH CAROLINA: one, Tigerville, Aug. 20, 1930, (R. H. Beamer) [Snow Colln., Kansas Univ.]. TEXAS: two, College Station, March 16, 1934, (H. J. Reinhard), [Texas A & M Colln.]; one, Jackson County, August 9, 1928, (R. H. Beamer), [Snow Colln., Kansas Univ.]. CANADA: series from Lethbridge, Alta., Aweme, Man., and Ogema, Sask., [U. S. Natl. Mus.].

To illustrate further the variation in this species, it may be noted that of the three specimens from Idaho, one from Caldwell is very dark, almost black, with indistinct mesonotal vittae, and a dark triangle with only a slightly paler central area. The other specimen from Caldwell is slightly teneral, but it is exactly like the palest specimen of the entire series. The third individual from Idaho is intermediate in the intensity of color on the legs, triangle, and mesonotum. It is such variation that has led the author to regard the whole series as one species, based upon structural similarity rather than upon the unstable grounds of intensity or extent of color. Within limits, the latter is useful, but it must always

be used with caution.

The specimens from Canada and the Northwest are larger and darker in most cases, and possibly the species should be divided into two sub-species. More complete collections should settle this question. The Canadian material is probably the basis for Gibson's published records (1916, 1917, Ent. Soc. Ontario, Ann. Repts., XLVI, p. 219, and XLVII, p. 157). C. W. Johnson (1925, Dipt. New England) recorded *integra* from several localities in Massachusetts, and again (1930) from Nantucket, and Weiss (1926) recorded it from Seaside Park, New Jersey. Since these agree with the known distribution, I accept them as probably correct.

### ***Chloropisca pullipes* Coq.**

1898. *Chlorops pullipes* Coquillett, Jour. N. Y. Ent. Soc., VI, p. 47. [N. Mex., Colo.].

1912. *Chloropisca pullipes*; Becker, Ann. Mus. Nat. Hung., X, p. 31. (Gen. comb.).

The status of this species has been discussed at some length under *appropinqua*. Specimens labeled *pullipes* in the collections seen by the author have usually turned out to be the other species.

Distribution, southwestern. Type material: Colorado, no locality given, and Santa Fe, New Mexico. ARIZONA: two, Bill Williams Fork, August, (F. H. Snow); Oak Creek Canyon, August, (F. H. Snow). COLORADO: one, Colorado Springs, August, (E. S. Tucker); one, Tabernash, August, (Tucker). NEW MEXICO: Elk, June 28, 1932, (L. D. Beamer); Magdalena Mts., August, 1894, (Snow). [All in the Snow Colln., Kansas Univ.].

Snow (1903, Kansas Univ. Sci. Bul., II, p. 220) recorded it from Morton and Finney Counties in Kansas, and Tucker (1907, Kansas Univ. Sci. Bul., IV, p. 105) recorded it from as far east as Sedgwick County, Kansas. In view of the frequent confusion with *appropinqua*, however, these records cannot be accepted without verification. From the known distribution of the two species, the above records probably belong under *appropinqua*.

### ***Chloropisca rubida* (Coq.)**

1898. *Chlorops rubida* Coquillett, Jour. N. Y. Ent. Soc., VI, p. 46. [Colorado; Placer County, California].

1912. *Chloropisca rubida*; Becker, Ann. Mus. Nat. Hung., X, p. 34. (Gen. comb.).

Distribution, western. CALIFORNIA: Cuyamaca Mts., San Diego County, August 16, 1914, (J. C. Bradley), [Cornell Univ. Colln.]; 13, Cuyamaca Lake, July 6, 1929, (P. W. Oman); one, Giant Forest, July 28, 1929, (R. H. Beamer); three, Laguna Mts., July 6, 1929, (R. H. Beamer); six, Orange County, July 14, 1929, (P. W. Oman); five, San Diego County, July 7, 1929; one, San Diego County, February 21, 1923, (W. Benedict); one, Winters, August 6, 1929, (R. H. Beamer), [all Snow Colln., Kansas Univ.]. COLORADO: one, no locality, [Colo. Agr. Coll. Colln.]; one, Boulder, May 25, 1932, (M. T. James), [James Colln.]; one, Maybell, June 30, 1931, (H. T. Peters), [Snow Colln.]. MONTANA: two, Missoula, August 11, 1931, (R. H. Beamer), [Snow Colln.]. NEVADA: one, Carson City, August 9, 1929, (R. H. Beamer), [Snow Colln.].

In the literature, Aldrich (1905, Catalogue) recorded it from Hagerman, Idaho; Becker, from Pacific Grove, California, May, (Aldrich); and Baker (1904, Invertebrata Pacifica, I, p. 28) from Stanford University, California. The species is so distinct that these records are undoubtedly correct.

***Chloropisca sulfurifrons* Duda (?)**

1930. *Chloropisca sulfurifrons* Duda, Folia Zool. et Hydrobiol., II, p. 124. [Costa Rica].

The four specimens recorded below are placed under Duda's name with a question, because it is impossible to determine them definitely on the basis of the few lines of description given in his key. As far as that goes, the specimens agree perfectly. Since it would not be at all improbable for the species to range up into southern Texas, the four are recorded here as *sulfurifrons*, pending the appearance of more definite information on the identity of the species. The shining yellow triangle, with only the ocellar spot black, and the linear cheeks, make the species rather distinct.

Distribution: TEXAS: two, Weslaco, March 25, 1930, (S. W. Clark), [Texas A. & M. Coll. Colln.]. MEXICO: two, "Mexico, 11-28, S. J. Allende," [U. S. Natl. Mus.].

***Chloropisca variceps* Lw.**

1863. *Chlorops variceps* Loew, Berl. Ent. Ztschr., VII, p. 46. (Cent. III, no. 86). [Pennsylvania].

1935. *Chloropisca marianapolitana* Ouellet, Le Naturaliste Canadien, LXI, p. 320. [Quebec].  
*New synonym.*

Synonym: *prolifera* O. S.

Several specimens of *marianapolitana*, which were kindly given me by the author of the species, were compared with Loew's types of *variceps*, and found to be the same species. The Canadian specimens are a trifle darker (which is true of many species), and the color on the sides of the triangle is slightly more extensive, but otherwise there is no difference.

Distribution, northern. A number of specimens have been determined by the writer from California, Colorado, Idaho, Massachusetts, New York, Oregon, Pennsylvania, and from Alberta, British Columbia, and Quebec. Besides these, records in the literature are known from Maine, New Hampshire, New Jersey, Vermont, and from Manitoba and Saskatchewan. One very dark specimen from Cloudercroft, N. Mex., June 28, 1932, (R. H. Beamer), [Snow Colln., Kansas Univ.] also appears to belong to this species.

**AMERICAN SPECIES OF LUDIUS; THE PROPOLA GROUP.\***

BY W. J. BROWN,

Ottawa, Ont.

The species considered here are closely allied to those of the *fallax* and *triundulatus* groups and to the strongly characterized *vernalis* Hentz, *hamatus* Say, *planulus* Lec., and *nigricollis* Bland. All of these together form a natural group characterized by the general body form and type of vestiture and sculpture. The body is never cylindrical or very elongate. The posterior pronotal angles are short, broad basally, not at all convex, and not or very finely carinate. The propleura are not or only very shallowly emarginate at base, and the lateral margins of the elytra are more broadly reflexed than usual. The vestiture is fine and abundant. The punctures of the pronotum and venter are quite fine and close, and the punctures are not or scarcely closer on the sides of the pronotum than at the middle of the pronotal disk.

The species falling in couplet 8 of the following key are confused in col-

\*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

lections under the name *propola* and were considered variants of *propola* by Dr. Van Dyke (1932, Trans. Cal. Ac. Sci. 4th ser., XX, 433). Study of considerable material has shown that they occur in nature as several homogeneous populations, and I have treated them accordingly. The species discussed below have the following characters in common.

Elytra yellow or very pale brown, frequently maculate with blackish; the body black except in *candidus*. Vestiture not dense, very fine, distinct both above and beneath, yellow in color except as noted in the following descriptions. Antennae moderate in length, not strongly serrate; the second segment distinctly longer than wide, equal in width to and shorter than the third, the third segment equal in length to or shorter than the fourth; the fourth segment wider than the third and not as long as the second and third united. Pronotum subequal in length and width, closely and very finely punctate; the punctures quite constant except as noted below; the posterior angles not or finely carinate. Elytra widened to apical third or parallel; the striae fine, finely punctate; the intervals convex, finely punctate, the punctures not dense, not very distinct. Prosternal sutures not excavated. Propleura with the punctures more or less confluent, feebly and broadly emarginate at base. Prosternum, metasternum, and abdomen very closely and finely punctate.

#### KEY TO SPECIES

1. Each elytron with a transverse, post median, blackish spot. Posterior pronotal angles reddish yellow. Each lateral lobe of aedeagus with a tooth near apex ..... 6.  
Elytra without transverse spots on apical half. Pronotum black, the posterior angles not or scarcely paler. Lateral lobes of aedeagus without teeth .... 2.
2. Elytra without spots ..... 3.  
Elytra with black spots ..... 5.
3. Each elytron with the sutural interval blackish. Length about 7 mm. ....  
..... 1. *ochreipennis* Lec.  
Elytra entirely very pale brown ..... 4.
4. Length 8 mm. Male antenna a little longer. Aedeagus with the median lobe very wide. Que. .... 2. *watsoni* n. sp.  
Length 9 or 10 mm. Male antenna shorter. Median lobe of aedeagus moderately wide. B. C. .... 3. *hoppingi* Van Dyke.
5. Each elytron with a single spot at basal two-fifths .. 4. *bipunctatus* n. sp.  
Each elytron with a spot near the scutellum and an elongate spot extending over middle two-fifths ..... 5. *exclamationis* Fall.
6. Eastern species ..... 7.  
Species of the Rocky Mountain and Pacific regions ..... 8.
7. Length 11 mm. or more. Each posterior pronotal angle with a fine, distinct carina. Legs yellow ..... 6. *hieroglyphicus* Say.  
Length not greater than 9 mm. Carinae of posterior pronotal angles not or scarcely evident, never distinct. Legs dark brown or blackish, very rarely yellow ..... 8. *propola propola* Lec.
8. Legs yellow. Calif. .... 9.  
Legs dark brown or blackish except in *pudicus* ..... 10.

9. Pronotum largely or entirely reddish-yellow. Subbasal markings of the elytra much reduced or obsolete ..... II. *candidus* n. sp.  
 Pronotum black. Subbasal markings of the elytra well developed .....  
 ..... 9. *pallidipes* n. sp.  
 10. Each elytron with a post humeral and a sutural spot, these strictly transverse in arrangement. Calif. .... 10. *californicus* n. n.  
 Each elytron with two subbasal spot or a band, the markings slightly oblique. -  
 B. C. .... II.  
 11. Length 9.8 mm. or more. Posterior pronotal angles distinctly carinate. Legs not or scarcely darker than the elytra ..... 7. *pudicus* n. sp.  
 Length not greater than 9 mm. Carinae of posterior pronotal angles not or scarcely evident. Legs dark brown .... 8a. *propola columbianus* n. subsp. -

### 1. *Ludius ochreipennis* Lec.

*Corymbites ochreipennis* Lec. 1863, Smiths. Misc. Coll. No. 167, 85.

Length 6.5-7 mm.; width 2.2-2.5 mm. Black, the legs sometimes dark brown; elytra very pale brown, the sutural interval blackish. Head two-thirds as wide as the pronotum in the male, three-fifths as wide in the female. Male antenna extending beyond the apices of the posterior pronotal angles by a distance equal to the length of one or two segments; the third segment three-fifths as wide as long, three-fifths or two-thirds as wide as and seven-tenths to three-fourths as long as fourth; the fourth two-thirds to three-fourths and the eleventh two-fifths as wide as long. Female antenna surpassing the apex of the angle by a distance equal to one-third the length of the terminal segment, much more slender than in the male; the third segment two-thirds as wide as and two-thirds as long as the fourth, the latter two-thirds as wide as long.

Pronotum nine-tenths as long as wide or a trifle less elongate, the posterior angles not carinate; the punctures a little coarser and less close than in the allied species. Sides of the elytra almost parallel. Aedeagus as figured, the median lobe often a little wider than in the figured specimen.

The types of this species were from Great Slave Lake. The lectotype, here designated, is a male bearing the name label in the Leconte collection. I have eight specimens from Rolla, B. C., and Hootalinqua and Lower Laberge, Y. T.

### 2. *Ludius watsoni* n. sp.

*Male.* Length 8 mm.; width 2.5 mm. Black; the elytra very pale brown, not maculate. Head three-fifths as wide as the pronotum. Antenna surpassing the apex of the posterior pronotal angle by a distance equal to the length of one and three-quarters segments; the third segment one-half as wide as long, seven-tenths as wide as and four-fifths as long as the fourth; the fourth segment one-half and the apical segment two-fifths as wide as long.

Pronotum equal in length and width, the posterior angles not carinate. Elytra with the sides almost parallel. Aedeagus as figured, the median lobe very wide.

*Female.* Antenna just attaining the apex of the posterior pronotal angle. Other characters as in the male.

*Holotype.*—♂, Mt. Lyall, 1500 ft., Gaspé Co., Que., June 19, 1934, (E. B. Watson); No. 3935 in the Canadian National Collection, Ottawa.

*Allotype.*—♀, same data, June 18, 1934.



The species is very closely allied to *hoppingi*.

### 3. *Ludius hoppingi* Van Dyke.

*Ludius hoppingi* Van Dyke, 1932, Proc. Cal. Ac. Sci. 4th ser., XX, 434.

Length 8.9-10.3 mm.; width 2.8-3.3 mm. Black; the elytra very pale brown, not maculate. Head nearly three-fifths as wide as the pronotum.

Antenna surpassing the apex of the posterior pronotal angle by a distance equal to half the length of the apical segment in the male; failing to attain the apex by the same distance in the female; in both sexes the third segment half as wide as long, seven-tenths as wide as and four-fifths as long as the fourth, the latter one-half as wide as long, the eleventh segment two-fifths to one-half as wide as long.

Pronotum equal in length and width, the posterior angles not carinate. Elytra almost parallel. Aedeagus as figured, the lateral lobes wide near their apices.

The species was described from Mt. Revelstoke, B.C., and was recorded from Mt. Rainier, Wash., and Lower Laberge, Y. T., by Dr. Van Dyke. The collection at hand contains seven topotypical specimens.

### 4. *Ludius bipunctatus* n. sp.

*Male*. Length 9.3 mm.; width 3.2 mm. Black; the elytra very pale brown, each elytron with a slightly transverse black spot extending from the third to the seventh stria at basal two-fifths. Pronotum with numerous suberect hairs in addition to vestiture of the usual type, these directed anteriorly, blackish; vestiture of elytra of the usual type but black except near base.

Head half as wide as the pronotum. Antenna surpassing the apex of the posterior pronotal angle by a distance equal to the length of the terminal segment; the third segment half as wide as long, three-fifths as wide as and three-fourths as long as the fourth; the latter three-fifths and the apical segment about two-fifths as wide as long; the intermediate segments with their outer angles more acute than in closely allied species.

Pronotum nine-tenths as long as wide, the posterior angles not carinate. Elytra with the sides feebly arcuate as in *propola*. Aedeagus as in *hoppingi* but with the median lobe relatively a little wider.

*Female*. Vestiture as in the male but entirely yellow. Antenna just attaining the apex of the posterior pronotal angle, a little less strongly serrate than in the male; the third segment three-fourths as wide as the fourth, the latter one-half as wide as long, otherwise as in the male. Pronotal sides a trifle more strongly arcuate than in the male.

*Holotype*.—♂, Sanca, B. C., 1800 ft., May 5, 1933, (G. Stace Smith); No. 3934 in the Canadian National Collection, Ottawa.

*Allotype*.—♀, same data, May 11, 1933.

*Paratypes*.—2 ♂, Creston, B. C., May 9 and 10, 1928, (G. Stace Smith); 1 ♂, Copper Mtn., B. C., July 10, 1929, (G. Stace Smith); 1 ♀, Trail, B. C., June, 1902, (J. M. McCoun); 1 ♀, Waterton Lakes, Alta., June 25, 1929, (J. H. Pepper).

The paratypes measure from 9.3 to 10.4 mm. The spot of each elytron may extend from the second to the eighth stria and is sometimes subcircular in form.

The legs and antennae are dark brown in one specimen. The sexual variation in the color of the vestiture is very unusual. In some of the males, nearly all the hairs on the basal part of the elytra are black. The species is less elongate than *hoppingi*.

##### 5. *Ludius exclamationis* Fall.

*Corymbites exclamationis* Fall, 1910, Trans. Am. Ent. Soc. XXXVI, 135.

Length 10.5 mm.; width 3.7 mm. Black; the elytra bright yellow; each elytron with a subcircular black spot on the second, third, and fourth intervals, this spot separated from the scutellum by a distance equal to half its own diameter and by a distance twice as great from a longitudinal black spot; the latter extending over the middle two-fifths of the elytron between the fourth and eighth striae and extended to the sutural interval near its posterior extremity.

Head a trifle more than half as wide as the pronotum. Antenna failing to attain the apex of the posterior pronotal angle by a distance equal to two thirds the length of the apical segment; the third segment half as wide as long, seven-tenths as wide as and four-fifths as long as the fourth, the latter three-fifths and the eleventh one-half as wide as long.

Pronotum equal in length and width; the posterior angles not carinate. Elytral with the striae feebly impressed and not very distinct except at base; vestiture blackish on the black portions of the elytra. Aedeagus much as in *hoppingi*.

The above notes are based on a single male from Mill Creek, Tuolumne Co., Calif. The aedeagus of the specimen is badly damaged, having only the basal piece and one lateral lobe entire, but seems to resemble that of *hoppingi*. The sides of the elytra are more strongly arcuate than in the species associated with it by characters of the aedeagus, the species agreeing in this respect with *propola* and its allies. The cotypes of this species were taken near Lake Tahoe, Calif.

##### 6. *Ludius hieroglyphicus* Say.

*Elatr hieroglyphicus* Say, 1839, Trans. Am. Philos. Soc. VI, 172; Lec. ed. II, 607.

*Ludius bicinctus* Cand., Mem. Soc. Roy. Sci. Liege XVII, 173.

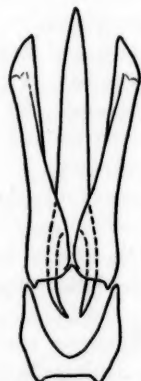
*Corymbites ctenicerus* Germ. Har., 1869, Coleopt. Catalog. V, 1577.

Length 11-12.7 mm.; width 3.9-4.3 mm. Black; the posterior pronotal angles, elytra, anterior and posterior margins of prothorax beneath very pale brownish-yellow; abdomen in part and antennae reddish-brown, the latter paler at base; each elytron with a subbasal band and a post median lunule black; the band slightly oblique, extending from humeral umbone to suture and prolonged on the interval and sometimes joining the post median lunule on the second interval; the second and third intervals to middle or beyond, frequently interrupted on the fourth lunule with the convex side directed anteriorly, prolonged almost to apex on the second and third intervals.

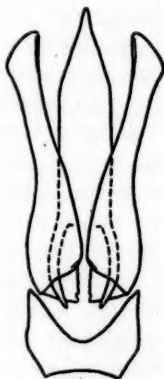
Head between half and three-fifths as wide as the pronotum. Antennae not differing in the sexes, failing to attain the apex of each pronotal angle by a distance equal to as much as the length of the apical segment; the third segment two-fifths or one-half as wide as long, seven- to eight-tenths as wide as and virtually as long as the fourth, the latter three-fifths and the eleventh about two-fifths as wide as long.

Pronotum subequal in length and width; each posterior angle finely but

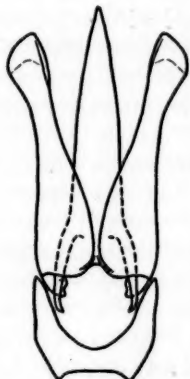
distinctly carinate, the carina quite close to the lateral margin. Vestiture of black parts of the elytra not darker than that of the pale portions. Aedeagus as figured; the median lobe relatively wider and the portion of each lateral lobe distad to the tooth less elongate than in *pudicus*.



ochreipennis



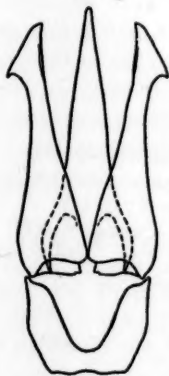
watsoni



hoppingi



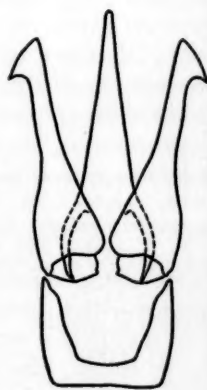
hieroglyphicus



pudicus



propola



candidus

This species differs from all others which are closely allied in having the hairs on the black portions of the elytra as pale as those on the other parts and in having the post median lunule prolonged posteriorly on the second and third intervals. The types of the present species came from Massachusetts, New Hampshire, and Pennsylvania. The collection before me contains fifty-eight specimens from Pennsylvania; Antrim, Gorham, and Mt. Washington, N. H.; Dartmouth, Mass.; Knowlton, Ft. Coulonge, Aylmer, and Wright, Que.; Normandale, Strathroy, Leamington, and Go Home Bay, Ont.; Aweme and Teulon, Man.

### 7. *Ludius pudicus* n. sp.

*Male.* Length 11.1 mm., width 4 mm. Black; the posterior pronotal angles, elytra, legs, and anterior and posterior margins of prothorax beneath pale brownish-yellow; abdomen in part and antennae reddish-brown, the latter paler at base; each elytron with a transverse, post median lunule as in *propola* and with a slightly oblique blackish band extending from a point immediately behind the humeral umbone to the first stria and extended over the second interval to basal two-fifths.

Head half as wide as the pronotum. Antenna as in *hieroglyphicus*, *canidus*, and *propola columbianus*, failing to attain the apex of the posterior pronotal angle by a distance equal to the length of the terminal segment. Pronotum nine-tenths as long as wide, punctate as in *hieroglyphicus* and *propola*; each posterior angle with a fine but distinct carina, the carina more distant from the lateral margin than in *hieroglyphicus*. Aedeagus as figured, much as in *hieroglyphicus* but with the median lobe a little more slender and with that part of each lateral lobe distad to the tooth more elongate.

*Female.* Each elytron with the subbasal band interrupted on the fourth interval and the post median lunule interrupted at the sixth stria. Antenna as in the male but failing to attain the apex of the angle by a distance equal to the length of two segments.

*Holotype.*—♂, Vernon, B. C., June 6, 1920, (Ralph Hopping); No. 3926 in the Canadian National Collection, Ottawa.

*Allotype.*—♀, Summerland, B. C., May 28, 1932; (A. N. Gartrell).

*Paratypes.*—21, same locality as holotype; 5, same locality as allotype; 3, Salmon, Arm, B. C., (Hugh Leech); 24, Copper Mt., B. C., (G. Stace Smith); 8, Creston, B. C., (G. Stace Smith); 4, Missezula Lake, near Aspen Grove, B. C., (G. Stace Smith); 1, Winfield, B. C., (G. Stace Smith); 1, Nash, B. C., (G. Stace Smith); 1, Sanca, B. C., (G. Stace Smith); 6, Keremeos, B. C., (C. B. Garrett); 2, Midday Creek, B. C.; 15, Midday Valley, Merritt, B. C.; 2, Geona Bay, Duncan, B. C., (W. Mathers); 3, Nicola, B. C., (P. N. Vroom); 2, Nicola Lake, B. C.; 5, Aspen Grove, B. C., (J. R. Howell and P. N. Vroom); 1, Otter Creek, B. C., (Hopping); 3, Lillooet, B. C.; 1, Fitzgerald, B. C., (W. R. Carter); 1, Cranbrook, B. C., (A. A. Dennys); 1, Vancouver Island, B. C., (G. W. Taylor); 1, Vancouver, B. C., (R. H. Chrystal); 2, Enderby, B. C.; 1, North Bend, B. C., (W. B. Anderson); 1, Brookmere, B. C., (R. D. Bird); 2, Saanich Dist., B. C., (W. Downes); 3, Victoria, B. C.; 2, Waterton Lakes, Alta., (J. McDunnough); 1, Blairmore, Alta., (J. H. Pepper).

The paratypes measure from 9.8 to 12.5 mm. and show some variation in color. The elytral markings are frequently interrupted as in the allotype, and they may be reduced in size and pale brown in color. Frequently the subbasal markings are not extended on the second interval and the specimens then resemble *propola columbianus* in color. Rarely the subbasal and postmedian markings are joined on the second interval, and very rarely they are joined behind the humeral umbone. The propleura may be reddish-yellow, and the abdomen may be largely red. The aedeagus shows a little variation but differs constantly from that of *hieroglyphicus* as noted in the description above. The antenna fails to attain the apex of the posterior pronotal angle by a distance equal to the length of from one-

half to two segments in the male and two or two and one-half segments in the female. The species bears a superficial resemblance to *nigricollis* Bland.

#### 8. *Ludius propola propola* Lec.

*Corymbites propola* Lec., 1853, Trans. Am. Philos. Soc. X, 437.

*Corymbites furcifer* Lec., 1853, Trans. Am. Philos. Soc. X, 438.

Length 7.1-8.8 mm.; width 2.6-3.1 mm. Black; the basal antennal segments and legs dark brown or blackish, the latter only very rarely brownish-yellow; posterior prothoracic angles and elytra pale brownish-yellow, the latter with blackish subbasal and post median spots; the subbasal as described below; the postmedian spot of each elytron a transverse lunule with convex side directed anteriorly, situated just behind middle of the elytron.

Head about three-fifths as wide as the pronotum. Antennae similar in the sexes, barely surpassing or just failing to attain the apices of the posterior pronotal angles; the third segment two-fifths to one-half as wide as long, two-thirds to three-fourths as wide as and three-fourths to four-fifths as long as the fourth, the latter half to three-fifths as wide as long; the apical segment about two-fifths as wide as long.

Pronotum subequal in length and width; the carinae of the posterior angles not or scarcely evident, never distinct. Aedeagus as figured, as in *candidus* and *pallidipes*.

In specimens from the Lake Erie and Ottawa districts of Ontario and from the more southern parts of Quebec, the subbasal markings of each elytron consist of a small humeral spot and a vitta. The spot is situated on or immediately behind the humeral umbone. The vitta is more distant from the base of the elytron, being separated from the scutellum by a distance subequal to the length of the latter. At its base, it occupies the second and third intervals, and it invariably extends on the second interval to or beyond the middle of the elytron. Infrequently it joins the post median lunule. It is usually separated from the humeral spot by the fourth or fourth and fifth intervals; sometimes it joins the spot, and the basal markings then appear as an oblique, subbasal band prolonged posteriorly along the second interval. The basal markings in these specimens are similar to those of *hierogyphicus*. In a series of thirteen specimens from Smoky Falls, Mattagami River, Ont., the average size is a trifle greater than in the more southern specimens, and the elytral vitta is reduced in most specimens to an elongate spot which does not attain the middle of the elytron. A series of thirteen specimens from Aweme, Man., shows more variation. Seven of the specimens are marked like those from the Ottawa district. In three, the vitta is reduced as in the Smoky Falls series; in three others, the basal markings are obsolete.

The specimen bearing the *propola* name label in the Leconte collection, here designated lectotype for the species, is a female with the basal elytral markings obsolete. It was collected at Eagle Harbour, Lake Superior. The unique type of *furcifer* came from the same locality and is marked like Ottawa examples. It appears that the Aweme series discussed above is quite typical for color. In view of the variation noted above, I believe it best to apply the name *propola*, in the restricted sense, to all these eastern specimens. In addition to the localities noted above, the following are represented by the specimens before me. Portauquique



and Kentville, N. S.; Renous and Bathurst, N. B.; Wright, Aylmer, Knowlton, and Cascapedia, Que.; Normandale, Fisher Glen, Carp, Biscotasing, Hymers, and Sudbury, Ont.

**8a. *Ludius propola columbianus* n. subsp.**

*Male.* Length 7.9 mm. Antenna just attaining the apex of the posterior pronotal angle, the third segment fully nine-tenths as long as the fourth. Basal markings of each elytron consisting of a slightly oblique band extending from immediately behind the humeral umbone to the suture and narrowly interrupted on the fourth interval. Other characters as in typical *propola*.

*Female.* Antenna as in the male but failing to attain the apex of the posterior pronotal angle by a distance equal to the length of the terminal segment. Elytral markings as in the male.

*Holotype*—♂, Creston, B. C., May 11, 1928, (G. Stace Smith); No. 3903 in the Canadian National Collection, Ottawa.

*Allotype*.—♀, same data, May 13, 1928.

*Paratypes*.—9, same data, on various dates; 6, Copper Mt., B. C., (G. Stace Smith); 1, Hope Trail, B. C., 4000 ft., July 2, 1930, (G. Stace Smith); 1, Victoria, B. C., June 11, 1926, (W. Downes); 3, Salmon Arm, B. C., (Hugh B. Leech); 1, Mara Mt., B. C., 7500 ft. (Edwards); 1, Sanca, B. C., May 29, 1933, (G. Stace Smith); 1, Midday Valley, Merritt, B. C., July 6, 1926, (Wm. Mathers); 19, Trinity Valley, B. C., varibus dates and collectors; 16, Vernon, B. C., (R. Hopping); 2, Spious Creek, B. C., (R. Hopping).

Most of the paratypes agree well with the holotype in color. In some of the specimens, the subbasal band of the elytron is more broadly interrupted, and in several it is entire. In a few, the markings are extended somewhat both on the second interval and at the umbone. The markings are not obsolete in any of the specimens.

The elytral vitta seen in typical *propola* as it occurs in southern and middle Ontario is reduced in *columbianus* so that only the basal portion persists as a subtriangular spot. In addition to this color difference, it will be noted on comparing specimens that the third antennal segment is usually a little longer in *columbianus*, a measured series of the latter showing the third segment to be a trifle more or less than nine-tenths as long as the fourth in the male and from eight- to nine-tenths as long as the fourth in the female. In the aedeagus of *columbianus*, there is some variation in the form of the apices of the lateral lobes. In some specimens these are as in the figured specimen of typical *propola*; in most of them, the subapical lateral tooth of each lobe is a little less strongly produced and the distad portion of the lobe is therefore slightly more elongate. The paratypes measure from 7.3 to 9 mm. in length.

In addition to the specimens noted above, I have two from Salmon Arm and Vernon, B. C., which resemble eastern examples of *propola* in every respect. Because of these specimens and because some geographical variation is evident in eastern series, I believe that *columbianus* is of subspecific status.

**9. *Ludius pallidipes* n. sp.**

*Male.* Length 9.4 mm. Basal markings of each elytron consisting of a circular post humeral spot and an elongate spot situated on the second and third

intervals, the latter subtriangular, extending from basal fifth to basal third of the elytron, separated by a distance equal to its own length from the scutellum. Antenna failing to attain apex of the posterior pronotal angle by a distance equal to the length of the apical segment. Legs pale brownish-yellow like the elytra. Other characters as in *propola*.

*Female*. Antenna failing to attain the apex of the angle by a distance equal to the length of two segments.

*Holotype*.—♂, Whitehall, Calif., July 1932, (I. W. Saylor); No. 3922 in the Canadian National Collection, Ottawa.

*Allotype*.—♀, Lake Tahoe, Calif., July, 1931, (I. W. Saylor).

*Paratypes*.—1 ♀, same data as allotype; 2 ♂, Tuolumne Co., Calif., June, 1931, 6,000 and 6,400 ft., (H. E. Hinton); 1 ♂, Pacific, Calif., Aug. 10, 1931, (H. E. Hinton).

The paratypes measure from 9.1 to 10.6 mm. and show a little variation in the size of the elytral spots. The basal markings of the elytra approach those of examples of typical *propola* in which the spots are reduced in size. From its closest allies, *pallidipes* differs in having the legs pale and the size larger. Possibly *pallidipes* will be shown to be a subspecies of *propola*.

#### 10. *Ludius californicus* n. n.

*Corymbites nubilus* Lec., 1853, Trans. Am. Philos. Soc. X, 438; *nec* Schrank, 1786, Bayerische Reise, 46.

Basal markings of each elytron consisting of two spots; the one situated immediately behind the humeral umbone, the other sutural; the spots separated by the third or third and fourth intervals; the sutural spot sometimes attaining the scutellum, usually subequal in length to and never extending posteriorly beyond the humeral spot. Third antennal segment from eight- to nine-tenths as long as the fourth. Other characters as in *propola*.

The basal markings of the elytra are quite constant in the series before me. Considered as an interrupted band, they are strictly transverse, not oblique as in *propola columbianus*. I should be inclined to consider *californicus* only subspecifically distinct from *propola* did it not occur in the same localities as *pallidipes* which resembles *propola* more closely in the disposition of the basal markings. The unique type of the present species came from an unrecorded locality in California. I have ten specimens from the following Californian localities: Cascade Creek, Lake Tahoe, Summit Mdw. in Fresno Co., Mt. Silliman, and Tuolumne Co.

Leconte's name *nubilus* is preoccupied by *Elater nubilus* Schrank, a synonym of *Ludius sjaelandicus* Mull.

#### 11. *Ludius candidus* n. sp.

*Male*. Length 10.2 mm.; width 3.7 mm. Head black; pronotum reddish-brown at middle, broadly reddish-yellow near all the margins; elytra, propleura, base and apex of prosternum, and legs yellow; antennae, prosternum at middle, metasternum, and abdomen reddish-brown; each elytron with a small post humeral spot and a larger spot subequal in size to the scutellum and situated on the second and third intervals at basal fourth pale brown, a blackish transverse lunule with convex side directed anteriorly situated immediately behind the middle.

Head half as wide as the pronotum. Antenna as in *propola columbianus* and *hieroglyphicus*, failing to attain the apex of the posterior pronotal angle by a distance equal to the length of the apical segment; the third segment half as wide as long, three-fourths as wide as and nine-tenths as long as the fourth, the latter three-fifths as wide as long.

Pronotum nine-tenths as long as wide; very finely punctulate, the punctures finer than in *propola* and *hieroglyphicus*; the posterior angles without trace of carinae. Aedeagus as figured, similar to that of *propola*.

*Female*. Color similar but with pronotum at middle very pale reddish-brown and with the subbasal spots of the elytra smaller and scarcely evident. Antenna failing to attain the apex of the angle by a distance equal to the length of two segments; the third segment a little more elongate, fully as long as the fourth.

*Holotype*.—♂, Mt. Hamilton, Calif., June, (L. W. Saylor); No. 3925 in the Canadian National Collection, Ottawa.

*Allotype*.—♀, same data.

*Paratypes*.—2♂, same data.

The paratypes measure 10.2 and 11 mm. In one of them, the pronotum at middle is not darker than at the margins; otherwise they agree with the allotype in color.

#### A REPORT ON SOME BRACONIDAE FROM BAFFIN ISLAND (HYMENOPTERA)\*.

BY G. STUART WALLEY,  
Ottawa, Ont.

During late July and August, 1935, Mr. W. J. Brown made extensive insect collections at Lake Harbour, a trading post on the southern coast of Baffin Island. The following is a report on the Braconidae taken by Mr. Brown. Specimens of this family were comparatively rare and only six species were encountered. Two of these are represented by single males and cannot be positively identified at present. The material is deposited in the Canadian National Collection; duplicate paratypes of new species are deposited in the United States National Museum.

##### **Macrocentrus innuitorum n. sp.**

Structure closely resembling *M. crassipes* Mues. but with more slender femora and fewer antennal segments, differing also in the color of the legs.

*Female*.—Length 4 mm. Head transverse, a little wider than thorax, vertically short, face between antennal foramina and clypeus slightly less than half as long as broad; temples and cheeks broad, rounded; clypeus very strongly convex, projecting rather forward, separated from face by a sharp impression, free margin slightly elevated, transverse; eyes and temples as in *crassipes*, vertex even more strongly convex and rising far above level of eyes; ocelli very small; postocellar line more than twice, ocell-ocular line five times diameter of lateral ocellus; head polished, face nearly impunctate; maxillary palpi short, not longer than height of

\*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

head; labial palpi very short; antennae distinctly shorter than body, 28 segmented, scape short and stout, second flagellar segment slightly more than twice as long as broad.

Thorax and wings very similar to *crassipes*; legs more slender than *crassipes* but rather short, femora not thickened, trochanters with indistinct teeth outwardly at apex; stigma emitting radius beyond middle.

Abdomen not longer than head and thorax combined; sculpture and form of tergites as in *crassipes*; ovipositor sheaths a little longer than body.

Head, thorax and abdomen black; mandibles except tips light brownish; palpi dark brownish-black; coxae black; trochanters and femora very dark brownish-black; the incisures between trochanters and femora and the apices of femora narrowly brownish; tibiae and tarsi brown; veins and stigma brown, the stigma with a small paler spot at base; sheaths dark brown.

*Male*.—Very similar to female. Antennae of the Allotype 32 segmented.

*Holotype*.—♀, Lake Harbour, Baffin Island, Aug. 3, 1935 (W. J. Brown); No. 4077 in Canadian National Collection, Ottawa, Ont.

*Allotype*.—♂, Lake Harbour, Baffin Island, Aug. 14, 1935, (W. J. Brown).

*Paratypes*.—3 ♂♂, 10 ♀♀, same locality as Holotype, Aug. 3-14, 1935, (W. J. Brown).

*Remarks*.—This is the most northern record for an American species of *Macrocentrus*. Mr. Brown informs me that the specimens were obtained by turning over loose boulders and occasionally by sweeping low grasses. The host is unknown. The specific name is derived from Innuït, meaning, "The Eskimo."

#### ***Apanteles compressiventris* Mues.**

Dr. Muesebeck has kindly compared my specimens with the types of *compressiventris* and has pronounced them that species. Previously the species has been known only from the type locality, Mt. Washington, New Hampshire. The series consists of 2 males and 4 females from Lake Harbour, Baffin Island, Aug. 3-10, 1935, (W. J. Brown). Two of these specimens have been deposited in the United States National Museum.

#### ***Apanteles* sp.**

A single male from Lake Harbour, Aug. 9, traces in Muesebeck's key (Proc. U. S. N. M., 58, 491, 1920) to *A. femurnigrum* Prov. but appears to differ in several respects from the original description of that species. At present no name can be assigned to it.

#### ***Meterorus* sp.**

Represented by one male specimen from Lake Harbour, Aug. 6. Traces to section 19 in Muesebeck's key (Proc. U. S. N. M., 63, Art. 2, p. 9, 1923) but does not appear to agree with any known species. The body is entirely black except for a small rufo-piceous spot on the posterior orbits. The legs are black to the apex of the femora with the remainder dark brown. The stigma is pale brownish.

#### ***Phanomeris borealis* n. sp.**

*Female*.—Length 3 mm. Head nearly as wide as thorax; face slightly broader than long, receding, mostly smooth but with a sub-opaque shagreened

area between mouth opening and eye, a small median convexity above mouth opening; malar space as great as basal width of mandible; frons, vertex, temples and cheeks polished; ocell-ocular line much longer than postocellar line (12:7) and three times as long as diameter of lateral ocellus; occipital carina rather broadly erased medially; temples rather broad, rounded; antennae longer than body, 38 segmented; first flagellar segment slightly longer than second. Thorax not higher than wide; pronotum dorsally with a large, deep median fovea; notauli smooth, sharply impressed anteriorly, becoming obsolete posteriorly; mesoscutum, scutellum, mesopleura and sides of pronotum polished, the latter, granular-rugose below, scutellar furrow narrow, feebly foveolate; propodeum rather dull, entirely, irregularly wrinkled with a weak median longitudinal carina on basal half, apically somewhat more coarsely sculptured; Metapleura shining, narrowly, irregularly sculptured along lower margin; radius arising distinctly before middle of stigma and attaining extreme apex of wing; nervulus postfurcal by nearly its length; recurrent entering first cubital cell; second abscissa of radius twice as long as first and a little longer than first intercubitus; second cubital cell scarcely narrowed outwardly; radiella wanting; cubitella distinct, complete; mediella as long as basal abscissa of basella; postnervellus rather weak, inclivous. Abdomen slightly longer than thorax, sub-petiolate, broadening strongly to base of third tergite where it is fully as broad as thorax; first tergite as broad at apex as long, elevated at middle, irregularly somewhat longitudinally rugulose with a small basal smooth area margined by carinae which unite behind to form a weak, median, longitudinal carina; second tergite transverse, irregularly longitudinally rugulose on median three-fourths and almost to apex; suture between second and third tergites impressed except narrowly at sides; third and following tergites polished, each with a postmedian irregular transverse row of hairs; ovipositor sheaths about as long as first tergite.

Black, labial palpi pale brownish, maxillary palpi darker brownish, mandibles and scape black; coxae black with apices brownish, more extensive on front and middle coxae narrowly so on hind; femora and tibia light brown, hind tibia narrowly dusky at apex; tarsi dark brownish black, abdomen entirely black; wings hyaline, stigma and veins brown to blackish.

*Male*.—More slender than the female with abdomen narrower than the thorax; antennae 37 segmented; third, fourth and fifth tergites with a trace of very dark brown at middle.

*Holotype*.—♀, Lake Harbour, Baffin Island, Aug. 13, 1935 (W. J. Brown), No. 4078 in Canadian National Collection, Ottawa, Ont.

*Allotype*.—♂, Same locality and collector, Aug. 8, 1935.

*Paratypes*.—3 ♂♂, 5 ♀♀. Same locality and collector, Aug. 5-13, 1935.

*Notes*.—The paratypic series varies only slightly from the types. One female specimen before me (not a paratype) from the same locality, Aug. 19, 1935, appears to pertain to this species but differs in having the third abdominal tergite finely sculptured on the median two-thirds of the basal half. One male paratype has the second intercubitus entirely absent.

Structurally the above species resembles *P. metalli* Mues. from which it differs markedly in color.



***Exotheus propinquus* n. sp.**

This species is referred to *Exotheus* because of the absence of an impressed suture between the second and third abdominal tergites. As Muesebeck (Proc. Ent. Soc. Wash., 34, 81, 1932) has already pointed out, this character may not be of sufficient generic importance to distinguish *Exotheus* from *Phanomeris* and the present species in other respects is indeed very similar to *Phanomeris borealis*. It appears less closely allied to *Exotheus alaskensis* Ashm. according to notes on the type with which Dr. Muesebeck has kindly compared my specimen. For the present, however, the traditional generic arrangement is preserved. The species is characterized as follows:

*Female*.—Length 2.5 mm. Agrees with the above description of *P. borealis* except as follows: Antennae 33 segmented; propodeum at base without distinct sculpture; suture between second and third abdominal tergites obsolete; tergites beyond first polished and entirely without sculpture. Color as in *P. borealis*.

*Holotype*.—♀, Lake Harbour, Baffin Island, August 8, 1935 (W. J. Brown). No. 4079 in Canadian National Collection, Ottawa, Ont.

*Notes*.—Differs from *Exotheus alaskensis* Ashm. in the following respects (characters for *alaskensis*). The stigma of *alaskensis* is relatively much longer and narrower; the third abscissa of radius is somewhat curved and ends distinctly above the apex of wing; head relatively broader; antennae much more slender with the first flagellar segment four times as long as broad and the following eight or ten segments three times as long as broad; first tergite more definitely longitudinally aciculate and propodeum more evenly and more finely sculptured; tegulae and legs including coxae brownish yellow.

In *propinquus* the stigma is about three and one-half times as long as broad; third abscissa of radius straight and ending at apex of wing; first flagellar segment very slightly more than twice as long as broad, the following eight or ten segments ranging from one and one-half to almost twice as long as broad; tegulae and coxae black.

Mailed Saturday, August 29th, 1936.

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